and Moon from the Tables of Leverrier and Hansen, obtaining the following elements :

		d	h	m	s
G. M. T. of ☌ in R.A.	..	June 14	5	14	0
Sun and Moon's R.A.	..		5	31	32·6
			°	′	″
Moon's Declination N.	..		23	55	26·8
Sun's ,, N.	..		23	15	29·6
Moon's Hor. Mot. in R.A.	..			40	2
Sun's ,, R.A.	..			2	35·6
Moon's ,, Decl. N.	..			5	8
Sun's ,, Decl. N.	..				7
Moon's Equa. Hor. Parallax	..			60	20·6
Sun's ,, ,,	..				8·8
Moon's True Semidiameter	..			16	28·1
Sun's ,,	..			15	45·6

I have taken the sidereal time at Greenwich mean noon at $5^h\ 30^m\ 5^s$, and the obliquity of the ecliptic at $23°\ 15'\ 11''$.

By direct calculation I find that Ayr, Penrith, York, and Cromer, are on the central line. Edinburgh is within the northern limit of totality ; while Warrington, Derby, and Cambridge, are on the southern limit. The width of the zone of totality is 140 miles.

Whatever confidence I may have as to the accuracy of these elements, and the position of the central line, I cannot lose sight of the fact that they differ materially from those given by Mr. Hind in the *Monthly Notices* for January.

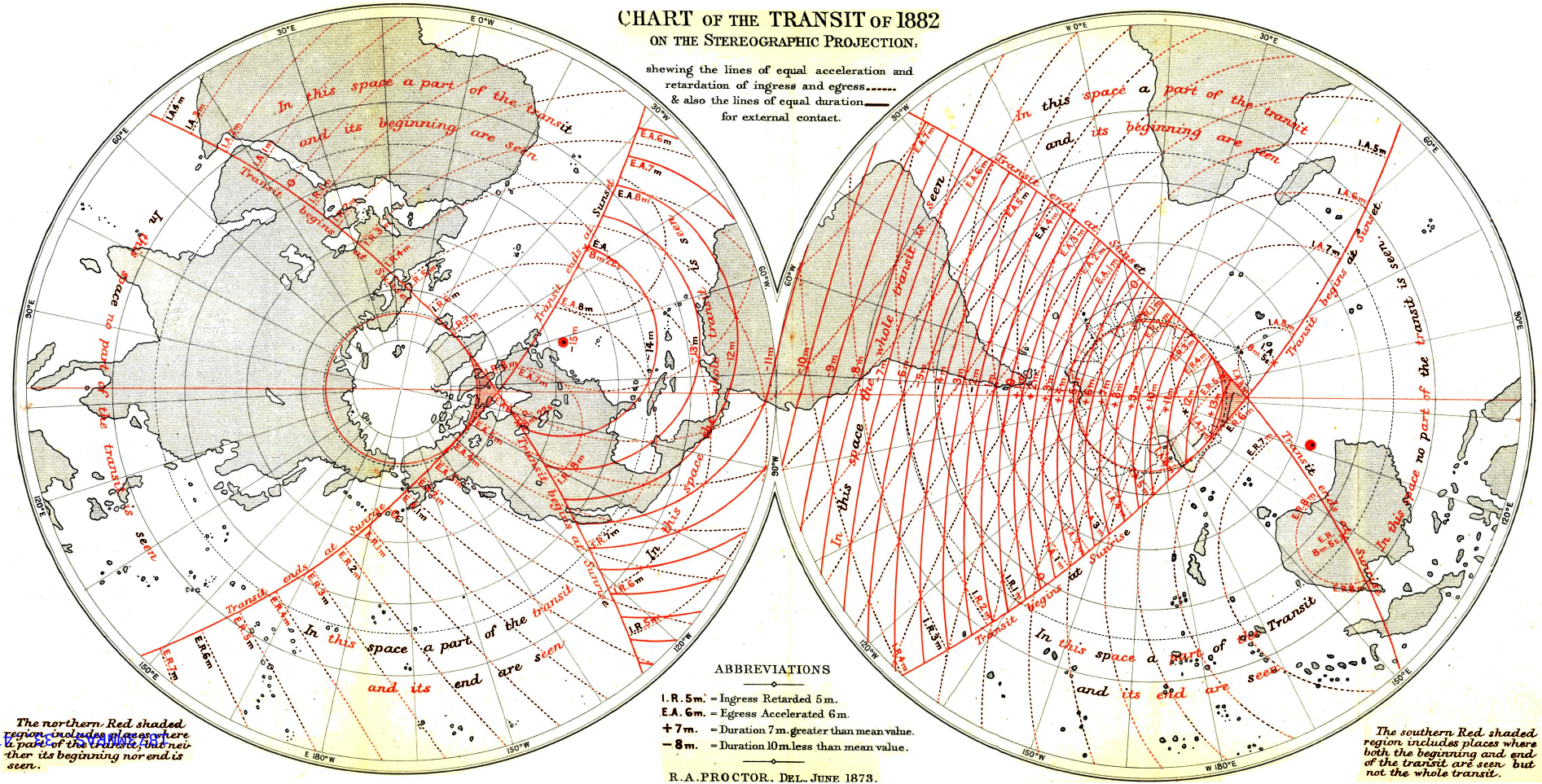
Norwich, June 1873.

Note explanatory of a Stereographic Projection of the Transit of 1882. By Richard A. Proctor, B.A., Cambridge.

It seems to me very desirable, in considering what preparations should be made for observing the Transit of 1874, to take carefully into account the relations which will be presented during the Transit of 1882. To neglect this precaution would, in my judgment, be as serious a mistake as for one nation to arrange its plans for either transit without a careful reference to the arrangements of other nations. It has been with the object of supplying this want that I have constructed the accompanying chart of the Transit of 1882 ; for although the circumstances of the later transit have been to some degree considered (by myself amongst other students of the subject), I do not think they have as yet been sufficiently brought into comparison with those of 1874. A comparison has indeed been instituted between the two

CHART OF THE TRANSIT OF 1882
ON THE STEREOGRAPHIC PROJECTION.

shewing the lines of equal acceleration and retardation of ingress and egress------ & also the lines of equal duration—— for external contact.



ABBREVIATIONS

I.R.5m. = Ingress Retarded 5m.
E.A.6m. = Egress Accelerated 6m.
+7m. = Duration 7m. greater than mean value.
−8m. = Duration 10m. less than mean value.

R.A.PROCTOR. DEL. JUNE 1873.

The northern Red shaded region includes places where a part of the transit, but neither its beginning nor end is seen.

The southern Red shaded region includes places where both the beginning and end of the transit are seen but not the whole transit.

transits in the *Monthly Notices* for December, 1868, wherein it is remarked that Halley's method "fails totally for the transit of 1874, and is embarrassed in 1882 with the difficulty of finding a proper station on the almost unknown Southern continent." This statement, however, does not by any means accord with the results of my own investigation. On the contrary, I find that Halley's method may be said to fail totally in 1882; while, as is now well known, I find (I may even say I have demonstrated) that Halley's method is the best of all methods depending on *contacts*, for 1874.

So much, with reference to the comparison between the two transits, I maintained in 1870 in Appendix I. to my treatise on the Sun. Mr. Penrose has arrived at a similar conclusion as to the general superiority of 1874 for contact-observations (*Monthly Notices* for April last). Quite recently M. Puiseux has enunciated the same view in a communication to the Paris Academy, which I find thus summarised in *Les Mondes*:—"Le passage de 1874 sera notablement plus avantageux que le suivant pour la détermination de la parallaxe solaire, par les observations de contact, c'est-à-dire par la méthode qui, après tout, donnera probablement les meilleurs résultats. Il est donc à désirer que rien ne soit négligé pour assurer dans les meilleures conditions l'observation du prochain passage. . . . . On pourra, en effet, sans sortir des régions facilement accessibles, obtenir en 1874 des différences de durée de passage s'élévant à 26 minutes, des différences d'heures d'entrée de 21 minutes, et des différences d'heures de sortir de 18 minutes, tandis qu'en 1882 ces différences se réduiront la première à 16 minutes, et les deux autres à 15 minutes."

A brief study of the accompanying map, and a comparison between this map and the corresponding map illustrating the transit of 1874, will suffice not only to confirm these statements (and my own statements to the same effect in 1871), but to show on what circumstances the superiority of 1874 over 1882 for Halley's method depends. I may remark, indeed, that the superiority of 1874 for Delisle's method is more apparent than real, being to a great extent (Mr. Stone thinks wholly) counterbalanced by the slowness with which *Venus* crosses the Sun's limb in 1874.

I would invite special attention to the position of the Halleyan curve marked o in the two maps, which curve may be called the Halleyan equator, since it marks the curve on the Earth where the duration has its mean value. It will be seen that this curve lies much farther south for 1882 than for 1874. It leaves a very limited region outside the Antarctic Circle, and if we take lines 10° from the curves marking where transit begins and ends at sunrise and sunset, these lines being taken within the region where the whole transit is seen, it is found that the region of the Earth where the duration will be less than the mean, with a Sun not less than 10° above the horizon both at ingress and egress, is very limited indeed. But in 1874, on the *unfavourable* or northern side of the Halleyan equator, we can find places where an excess

of duration of more than 15 minutes, with the required conditions as to altitude, can be obtained.

If we assume, in fact (which I think will be generally admitted), that no station can be regarded as suitable for Halley's method where the difference between the actual duration and the mean duration is less than half the maximum acceleration or retardation, or where the Sun is less than 10 degrees high at ingress or egress, then absolutely no station whatever is available in 1882, unless the south pole can be approached much nearer even than it was approached by Sir Jas. C. Ross in the famous expedition when Possession Island was discovered.

I confess that the prospect of successful observation at Possession Island, with a Sun only 5° high at ingress, seems to me so slight that I should hear with regret of any attempt to carry out the suggested scheme for wintering at Possession Island in 1882.

Note on the Appearance presented by the Fourth Satellite of Jupiter in Transit in the years 1871–3. By Charles E. Burton, B.A., Exp. Phys. T.C.D.

No. 1. Dec. 30, 1871. IV. when first seen, its distance from the limb of the planet being about one of its own diameters, appeared extremely dark, possibly as dark as when last seen, and approaching mid-transit. I could not satisfy myself that there was any defect of roundness in the dark spot which was once or twice considered to be bordered on its southern side by a bright crescent. The satellite appeared to traverse a bright zone of the planet, and at $12^h \pm$ G.M.T. was in close juxtaposition to the northern boundary of the Antarctic dusky cap. Definition fairly good, a power of 228 being effective at times on a silvered glass Newtonian equatoreal of 7 inches clear aperture.

No. 2. April 8, 1872, $8^h\,45^m$ to $11^h\,5^m$ G.M.T. IV. appeared during the whole time of the observation as a well-defined, almost entirely black spot. When first observed it had accomplished about one-fourth of its transit, and it was watched till three-quarters of its path had been described. During the first half of its observed path it appeared both blacker and also better defined than during the second half, the air being equally good the whole time. The transit took place along (and I believe within) the S. edge of a dark belt.

Mr. Erck goes on to say, "My friend Mr. C. Burton drew attention to the fact that the dark spot representing IV. was not round, but decidedly elongated in the direction of the belt during the whole time of observation. In this I concurred."

To this note by Mr. Erck I made one addition; that the following extremity of the elongated dark spot was more acute than the preceding at $11^h\,5^m$ G.M.T. (See *Astronomical Register*,